DETERMINATION OF MOISTURE AND TEMPERATURE OF COTTON FROM THE DRYING DRUM WITH THE DOG

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ANNOTATION

Most of the drying drums in ginneries today are obsolete. Almost all of them are the technology of the 50s of the last century. It is no secret that the new technologies imported from abroad are not effective enough in processing cotton grown in Uzbekistan. In our project, we propose to determine the temperature and humidity in the drying drum using IT. In this project, we plan to use Java or C ++ programs. The idea of determining the temperature and humidity in the drying drum using an Arduino device is also put forward.

Keywords: Drying drum, ardunio, programming, humidity, temperature.

Seed cotton should be dried and cleaned of contaminants in a timely manner to ensure that it does not lose its natural properties during storage and that the fiber and seeds produced are of good quality. There are two methods of drying wet seed cotton: natural drying - mainly hand-picked seed cotton in the field, in the open air in the sun;

Artificial drying - drying of low-industrial varieties of cotton by machine and hand-picking on special equipment of various constructions;

Sun-drying is widely used when it is necessary to reduce the moisture content of cotton seeds by 2-3%. To do this, special areas are leveled in the brigade sheds, the surface of which is plastered or asphalted with straw mud. Depending on the moisture content of the dried cotton seeds, they are spread in the sun at a thickness of 10-15 cm and periodically stirred and rolled to speed up the drying process.

Special drying units will be set up at ginneries and out-of-plant ginneries for artificial drying of seed cotton. In such sections, cotton seeds with high humidity and pollution are dried and cleaned.

The drying equipment installed in the drying and cleaning units can be aerofontan, chamber auger and drum, depending on the method of heating the cotton seed. The ginning industry uses drum dryers of various designs, which are highly efficient in terms of moisture absorption and production of dried cotton.

Drum dryers have a higher drying agent temperature than others and are easier to use.

Figure 1: shows the relationship between the moisture content of cottonseed components (fiber and seeds) and its average moisture content.

The graph in this picture shows that when the average moisture content of cotton seed is 10%, the fiber content is -7% and the seed yield is -18%. Therefore, when seed cotton is dried, its fiber dries faster than seed cotton (Figure 2).

The heating temperature of its components plays an important role in the drying of seed cotton. It has been experimentally determined how many degrees it can be heated to ensure that the fiber and seed quality are not compromised when drying seed cotton.

Seed cotton can be heated to 55 ° C, technical seeds to 70 ° C and fiber to 105 ° C. If the temperature of the cotton components is higher than the above-mentioned temperature, then the germination properties of the seeds will decrease, and in technical seeds, the oil yield will decrease. The fiber loses its strength, length and flexibility. Therefore, seed cotton should be dried evenly.

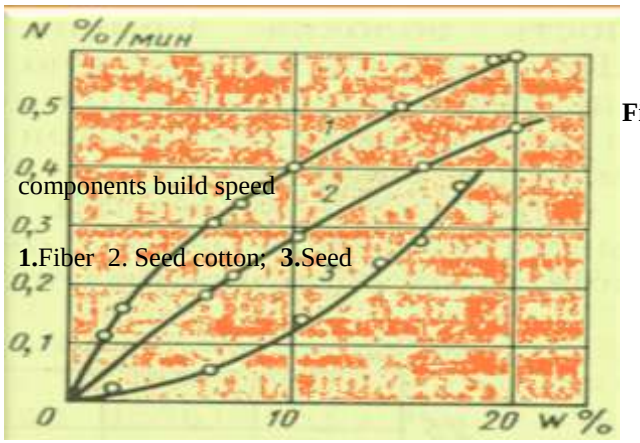


Figure 2. Seed cotton and its components build speed

1.Fiber 2. Seed cotton; **3.**Seed

The uniformity of the moisture content of the dried cotton depends on the uniformity of its moisture content at the time of reception, ie the moisture content at the time of reception should not change by more than 3-4%.

Seed cotton should be dried to the specified norm depending on its industrial navigation. This is due to the fact that the natural properties of cotton do not change during long-term storage of seed cotton at the normative humidity. During storage, I-II-III-grade should not exceed -11% for seed cotton and IV-V for 13%. If seed cotton is to be produced, its moisture content must be 8-9%.

The mass of cotton seed dried in drying drums can be calculated by the following equation:

$$m_1 = m_{ak} \cdot \left(1 + \frac{W_2}{100}\right) \quad \text{kg}$$

In this case: maq - absolute dry mass of seed cotton, kg;

$$m_{ak} = \frac{m_0}{(1 + \frac{W_1}{100})}, \text{kg}$$

where: m0 is the mass of seed cotton fed into the drying drum, kg;

W1; W2 - moisture content of seed cotton before and after drying,%;

Determination of moisture evaporated during drying is based on the following equation:

$$W = m_0 \frac{W_1 - W_2}{100 + W_1} = m_1 \frac{W_1 - W_2}{100 + W_2}, \text{kg}$$

Structure of seed cotton drying equipment

and performance mode

The ginning and drying units and ginning units at the ginneries are currently equipped with 2SB-10, SBO and SBT drying drums for drying or heating the ginned cotton. These drying drums are equipped with heat supply, transport equipment and supply systems to ensure continuous operation. Figure 3.11 shows the flow chart of the 2SB-10 drying drum, which is currently the most widely used in the ginning industry, and its views in the log sections (Figure 3.12).

The seed cotton is fed into the drying drum (4) together with the heat (drying agent) (2) using a supplier (1). Due to the rotation of the drum, the seed cotton rises to a certain height and falls to the ground as a result of mixing with the drying agent, then the dried seed cotton is sent from the drying drum through the unloading trough (10) to the next machine. The used drying agent is then discharged through the transmission shaft (9).

For economical and rational use of drying drums it is necessary to control the temperature, volume, humidity of the seed cotton, its constant drying agent. At the same time, the level of contamination of cottonseed is monitored, as well as the amount of cottonseed that has passed along with the contamination.

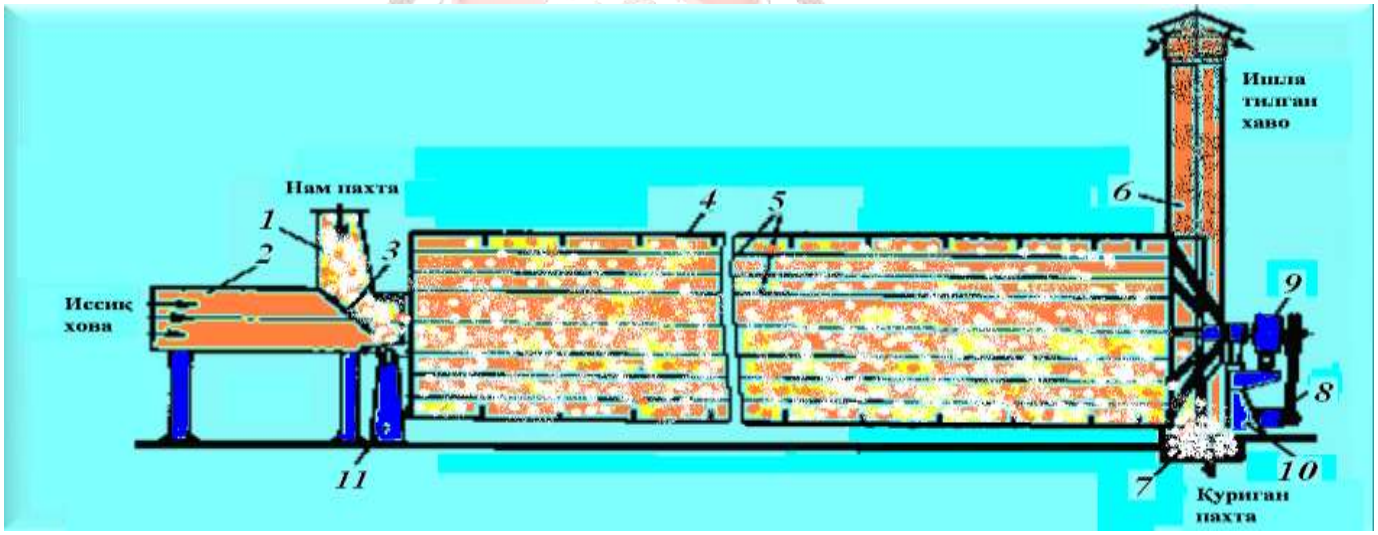


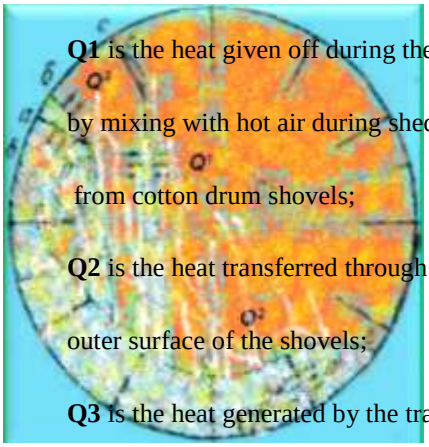
Figure 3. Technological scheme of 2SB-10 drying drum

1 pneumatic motor; **2**- hot air transmission line; **3**- reference surface;

4- drying drum; **5** paddles; **6** used air outlet shaft;

7- cotton seed with cotton seeds; **8**-electric motors; **9**-reducers;

10,11 bases;



Q1 is the heat given off during the swelling process

by mixing with hot air during shedding

from cotton drum shovels;

Q2 is the heat transferred through the

outer surface of the shovels;

Q3 is the heat generated by the transfer of hot parts and

the heat of the shell to the raw cotton

Figure 4. Scheme of heat transfer to wet seed cotton during the drying process

Specifications of 2SB-10 drying drum:

1 Productivity of cotton, kg / h 10000

2 Drying agent temperature C0 to 280

3 Moisture separation up to 10%

4 Heat consumption for moisture separation of 1 kg kDj / kg 8500

5 Drying agent consumption m3 / h 18000 ÷ 20000

6 Number of drum revolutions per month 11

7 Power of electric motors kW 13

8 Dimensions,]:

9 drum length 10000 mm

10 drums with a diameter of 3200 mm

The proposed project involves the use of IT to determine the temperature, humidity and air pressure in the working chamber of a demon. In this, we will first study the application environment.

Programming is divided into direct programming and automatic programming. In direct programming, the programmer does everything from developing the overall layout of the program to encoding and entering it into the machine. In automatic programming, the programmer simply creates a program diagram and writes it in abbreviated symbolic form, while the technical work, such as creating a profile and encoding it, is performed by the machine itself using a special programming program.

Typically, programming is done using high-level programming languages (Delphi, Java, C ++, Python). Because the semantics of these programming languages are close to human language, the programming process is much easier. Programming is the process of creating, testing, and modifying software for computers and other microprocessor-based electronic machines. One of the most efficient microprocessors.

An Arduino is a small board that has its own processor (microcontroller) and memory.

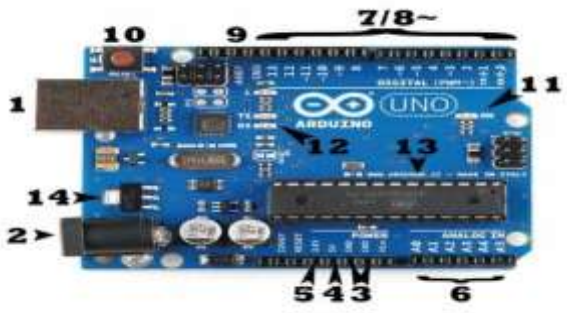
There are many types of Arduino, for example: Arduino Yun, Arduino Uno, Arduino Duemilanove, Arduino Diecimila, Arduino Nano, Arduino Mega, Mega 2560, Mega ADK, Arduino Leonardo, Arduino Micro and so on. An application that is small and large on this device can perform various devices, robots, and operations by creating algorithms. In other words, an Arduino is a device that combines software and hardware. As mentioned above, there are many types of Arduino, and the study of Arduino mainly uses the Uno or Nano type of Arduino. The difference from other types of Arduino Uno is the processor, microcontrollers, more or less digital and analog outputs. The user of the Arduino will be able to connect to it various electrical components and modules, for example: LED lights, sensors, relay modules network (Wi-fi, Bluetooth, Ethernet) modules, sensors, motors, magnetic door locks and powered by electricity all things. As mentioned above, the Arduino is a device that combines the technical and software part. Programs for Arduino are written in the usual C ++, simple and clear algorithms and programs are created to control I / O (Input-Input, Output-Output) in the contacts. Also Arduino IDE (Arduino software, compiler) running on Windows, Mac OS and Linux operating systems for writing programs on Arduino.

Figure 5. Arduino Uno device structure

Technical specifications of Arduino Uno:

Microcontrollers: ATmega328; Operating voltage: 5 V;

Input voltage (recommended): 7-12 V;



Input voltage (maximum): 6-20 V;

Digital input / output: 14 (6 of them can be used as KIM (Shirotno-Impulsnaya modulation));

Analog input: 6; AC current through input / output: 40 mA;

3.3 V AC for input: 50 mA;

Flash memory: 32 KB (ATmega328) is used as a 0.5 KB bootloader;

RAM: 2 KB (ATmega328);

EEPROM: 1 KB (ATmega328);

Frequency: 16 MHz;

Using an Arduino device, we will determine the humidity and temperature of the cotton seed from the drying drum.

In this case, the Arduino device is the motherboard. Special software codes are developed to determine the pressure on the Arduino device. The developed code. The USB cable is placed from the computer to the Arduino device. In addition, we need additional equipment to perform this process. One of the most important devices is the display. The display is a device designed to display text or graphic data on the screen of an electronic device. For this we use the I2C LCD display. To connect this display to the Arduino device from SDA, SCL, GND, VCC pins (Figure 6)

Special devices are used to determine the air pressure in the drying drum. One of these devices is the Module DHT11, which is used to measure humidity and temperature. The module uses 5V, GND and output pins to connect the DHT11 to the Arduino board (Figure 6).

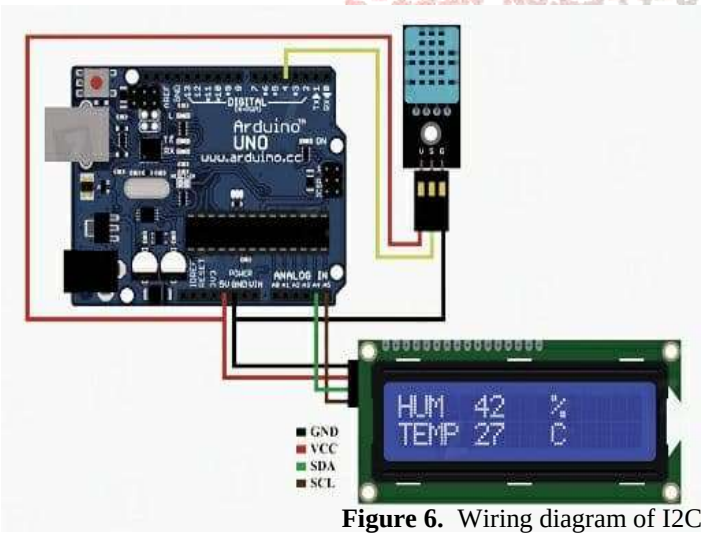


Figure 6. Wiring diagram of I2C LCD

display and Module DHT11 with Arduino device

According to the scheme shown in Figure 6. Module DHT11 is placed in the dried cotton outlet pipe of the drying drum. The Arduino device is placed next to the drying drum with a special housing. After this procedure. This project is the first step in the programming of the dryer drum, and in the course of further

research it is planned to implement other areas of programming the dryer drum. .It should be noted that this research opens up a new era for us to improve the drying drum.

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